

What is claimed is:

1. A directed spray mast for cleaning identified or selected surface areas in the interior of closed vessels, pipes, and the like through access ports of relatively small diameters comprising:

a) a multi-positionable, rotatable support pipe having upper and lower ends, said pipe having a substantially uniform diameter for insertion into an access port of a vessel to be cleaned;

b) lift bail means for supporting and vertically positioning said support pipe and for rotating same for radial positioning;

c) a water supply pipe positioned inside of and being substantially coaxial with said support pipe for supplying water, said water supply pipe extending above and below said support pipe;

d) a support plate attached to and extending downwardly from the lower end of said water pipe;

e) a spray nozzle assembly pivotally mounted to said support plate adjacent said plate's lower end, said assembly extending linearly with and being parallel to said mast pipe in its compact or closed position;

f) a submersible, video camera mounted on said nozzle assembly;

g) pneumatic actuator means, said means being pivotally mounted on said supply pipe at said pipe's lower end with the other end of said actuator being pivotally attached to said nozzle assembly for raising and lowering the nozzle assembly in response to actuation of the pneumatic

means whereby the nozzle assembly is caused to swing outwardly from said support plate to an expanded position of the spray mast and, with camera guidance, the nozzle assembly can be raised, lowered, and rotated to direct water spray to selected interior areas of vessel to be cleaned.

2. The directed spray mast of claim 1 including a water supply hose connected to a supply of water for delivering water to said water supply pipe, said hose having a water flow control valve associated therewith.

3. The directed spray mast of claim 1 wherein the spray nozzle assembly further comprises a spray nozzle and a support tube, said nozzle being supported by and operably connected to one end of said support tube, said support tube being pivotally attached at its other end to said support plate and intermediately pivotally attached to said pneumatic means.

4. The directed spray mast of claim 1 including flange means disposed around said support pipe adjacent its upper end, said flange projecting outwardly a distance sufficient to cover the opening of vessel port into which said spray mast has been inserted to prevent spray from leaving the vessel.

5. The directed spray mast of claim 2 including:

a) pneumatic lines operably connected to said pneumatic means, said line being disposed within said support pipe for a portion of their lengths and extending from said pneumatic means to the upper end of said mast pipe;

b) a cable line disposed within said mast pipe for a portion of its length and extending from said camera to said upper end of said support pipe; and

c) swivel means associated with said lift bail means for receiving said pneumatic and cable lines to permit rotation of said mast without crimping or extangling said lines.

6. The directed spray mast of claim 3 wherein the spray nozzle forms the lower end of said directed spray mast in the compact position of said mast.

7. A directed spray mast for cleaning identified or selected surface areas in the interior of closed vessels, pipes and the like through access port of relatively small diameter comprising:

a) a substantially straight water supply pipe suitable for being disposed vertically or horizontally and having upper and lower ends;

b) an elongated support plate having upper and lower ends, the upper end of said support plate being attached to the lower end of the supply pipe, said plate extending downwardly substantially in vertical alignment with said supply pipe;

c) a support tube pivotally connected to the lower end of said support plate, said tube extending downwardly in its compact or unexpanded portion whereby said supply pipe, support plate, and support tube are substantially vertically aligned;

d) a high pressure, flexible hose connected at one end to the support tube; and

e) a connecting support nut attached to the other end of said hose for connecting the hose to the lower end of said water supply pipe;

f) a pneumatic actuator having an upper closed end and a lower end from which a connecting rod extends, said actuator being attached at its upper end to the lower end of said supply pipe and said connecting rod being attached pivotally to an intermediate position on said support tube; whereby when said connecting rod is withdrawn said support tube will pivot upwardly to an expanded position of said spray mast;

g) a spray nozzle at the lower end of said support tube for spraying a concentrated stream of high pressure water that is supplied to said nozzle through said hose and supply pipe; and

h) a camera mounted on said support tube;

i) pneumatic supply lines for connecting said actuator to a source of pressurized air and a cable for connecting said camera to a video display screen;

j) a support pipe enclosing the upper portion of said water supply pipe, said pneumatic lines and said cable being threaded through the space between the supply tube and the support pipe; and

k) lift bail means at the upper end of said supply pipe providing an exit for said cable and pneumatic lines and for raising, lowering and rotating

the water supply pipe and the support tube carrying said nozzle as required in response to the video display provided by said camera.